CHUKA   **UNIVERSITY**

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DEGREE OF
BACHELOR OF COMMERCE

BCOM 161: BUSINESS MATHEMATICS I

STREAMS: BCOM YISI (ODEL)   **TIME: 2 HOURS**

DAY/DATE: TUESDAY 14/04/2020   **2.30 PM – 4.30 PM**

INSTRUCTIONS:

- **Answer Question One and any other Two Questions**
- **Do not write on the question paper**

QUESTION ONE

(a)   Define the following terms as used in set theory

         (i)   Finite set   [2 marks]
         (ii)   Null set   [2 marks]
         (iii)   Universal set   [2 marks]
         (iv)   Single ton set   [2 marks]

(b)   Toy ltd manufactures and sell a product branded "Mulika". The demand function for Mulika is while the supply function of . Determine the equilibrium price and equilibrium quantity for the product.   [5 marks]

(c)   Rita deposited sh. 20,000 into a fixed deposit account at an interest rate of 10% per annum compounded annually. Determine

         (i)   The accumulated amount at the end of the 4th year   [3 marks]
         (ii)   The time it will take for the savings to grow to sh. 53065.95   [5 marks]

(d)   The total cost function in XYZ ltd is modelled by the function TC=5q+100 while the total revenue function can be modeled as where q is the number of units produced and sold. Determine
         (i)   The break-even quantity to the nearest whole number   [5 marks]

     (ii)   Profit realized when 10 units are produced and sold.   [4 marks]

QUESTION TWO

(a)   Abdi borrowed a loan of sh. 20,000 from Sadaka Sacco at an interest rate of 10% per annum on reducing balance. The loan was to be repaid in 5 equal annual installments. Determine:

     (i)   Annual instalment amount payable   [3 marks]

     (ii)   A loan amortization schedule that would guide Abdi in loan repayment.
     [5 marks]

(b)   The value of a plot in Kisumu Fupi market can be modeled by the function where t is time in years.

     Required:
     (i)   What was the initial value of the plot   [3 marks]

     (ii)   What would be the value of the plot after 3 years to the nearest thousands.
     [3 marks]

(c)   Distinguish between the following terms as applied in financial mathematics
     (i)   Present value and future value   [3 marks]

     (ii)   Annuity and perpetuity   [3 marks]

QUESTION THREE

(a)   Given that and determine the composition   of the following

     (i)   [2 marks]
     (ii)   [2 marks]
     (iii)   [3 marks]

(b)   In ascending powers of x use binomial theorem to expand hence estimate the   value of   [7 marks]

(c)   At Kaigoro football club, a committee of 5 members is to be constituted from among 7 players, 8 fans and the coach. In how many ways can the committee be formed such that;

     (i)   No restrictions on its composition   [2 marks]
     (ii)   Atleast 2 fans must be included   [2 marks]
     (iii)   2 fans and the coach must be included   [2 marks]

QUESTION FOUR

(a)   In its first month of trade, ABC ltd made a profit at sh 20,000. The profits of the company
        increased by sh. 2000 in each of the subsequent months. Using sequence and series
        Determine

        (i)   The company's profit during the 10th month of operation   [3 marks]

        (ii)   The total profit made by the company after operating for 40 months.
                                                                                   [4
marks]

(b)   Vinywaji ltd produces and sell 3 flavors of soft drinks branded Tamu, Kali and Chachu.
        A survey involving 200 households was carried out in Chuka town to determine the
        customers preference on its three brands and the following are the results.

        52 households prefer Tamu flavor
        36 households prefer Kali flavor
        96 households prefer Chachu flavor
        6 households prefer Tamu and Kali flavours
        16 households prefer Chachu and Kali flavours
        16 households prefer Tamu and Chachu flavours
        48 households preferred none of the 3 flavours

        Required:
        Clearly showing your working

        (i)   Present the above survey report on a Venn diagram   [4 marks]

        (ii)   How many households preference was on the 3 flavours?   [3 marks]

        (iii)   How many households preferred atleast 2 flavours?   [3 marks]

        (iv)   How many households preferred kali but not Tamu flavours.   [3 marks]